WHAT IS CLAIMED IS:

1 A producing apparatus for producing a carbon structure comprising:

two electrodes having forefront portions opposed to each other;

a power supply for applying a voltage between the electrodes so that discharge plasma is produced in a discharge area between the electrodes; and

a magnetic field supplying unit for forming a magnetic field in an area where the discharge plasma is produced.

2 The apparatus according to claim 1, wherein the magnetic field generated by the magnetic field supplying unit includes one of a magnetic field having multidirectional lines of magnetic force and a magnetic field having a component parallel to a traveling direction of a discharge current.

3 The apparatus according to claim 1, wherein the discharge plasma generated in the discharge area is arc plasma.

4 The apparatus according to claim 2,

wherein the magnetic field supplying unit has one of a plurality of permanent magnets and a plurality of electromagnets, which are disposed to surround the discharge area along the traveling direction of the discharge current;

and

wherein all of the one are disposed so that identical poles of the one face the discharge area.

5 The apparatus according to claim 2,

wherein the magnetic field supplying unit has one of an even number of at least four permanent magnets and an even number of at least four permanent electromagnets, which are disposed to surround the discharge area along the traveling direction of the discharge current; and

wherein adjacent ones of the one are disposed so that alternately different poles of the one face the discharge area.

6 The apparatus according to claim 2, wherein the magnetic field supplying unit has one coil having a central axis, which is substantially coincide with the traveling direction of the discharge current.

7 The apparatus according to claim 1, wherein magnetic flux density at an edge of a forefront portion of an electrode of the two opposed electrodes for generating discharge plasma is not lower than 10^{-5} T and not higher than 1 T.

8 The apparatus according to claim 1, wherein

discharge current density at the time of generating discharge plasma is not lower than 0.05 A/mm^2 and not higher than 15 A/mm^2 with respect to an area of a forefront portion of an electrode for generating discharge plasma.

9 The apparatus according to claim 1, wherein the voltage applied to the electrodes by the power supply is not lower than 1 V and not higher than 30 V.

10 The apparatus according to claim 1, wherein the voltage applied to the electrodes by the power supply is a DC voltage.

11 The apparatus for producing a carbon structure according to claim 10, wherein an area of a forefront portion of a cathode of the two opposed electrodes is not larger than an area of a forefront portion of an anode thereof.

12 The apparatus according to claim 1, wherein at least the discharge area and the electrodes are contained in a closed vessel.

13 The apparatus according to claim 12, further comprising an atmosphere adjusting unit for adjusting one of pressure and gas species of the atmosphere in the closed vessel.

14 The apparatus according to claim 1,

wherein material of the electrodes is one of carbon and material which comprises carbon; and

wherein electric resistivity of the material is not lower than 0.01 Ω·cm and not higher than 10 Ω·cm.

15 A producing method for producing a carbon structure, comprising the steps of:

applying a voltage between two electrodes having forefront portions opposed to each other; and

generating discharge plasma in a discharge area between the electrodes;

wherein a magnetic field is applied in an area where the discharge plasma is generated.

16 The method according to claim 15, wherein the magnetic field includes one of a magnetic field having multidirectional lines of magnetic force and a magnetic field of a component parallel to a traveling direction of a discharge current.

17 The method according to claim 15, wherein the discharge plasma generated in the discharge area is arc plasma.

18 The method according to claim 16, wherein one of a plurality of permanent magnets and a plurality of electromagnets are disposed to apply the magnetic field so that the one surround the discharge area along a traveling direction of a discharge current and all identical poles of the one face the discharge area to generate the magnetic field.

19 The method according to claim 16, wherein one of a plurality of permanent magnets and a plurality of electromagnets are disposed to apply the magnetic field so that the one surround the discharge area along a traveling direction of a discharge current and alternately different poles of adjacent ones of the one face the discharge area to generate the magnetic field.

20 The method according to claim 16, wherein one coil having a central axis, which is substantially coincide with a traveling direction of a discharge current to generate the magnetic field.

21 The method according to claim 15, wherein in the discharge plasma generating step, magnetic flux density at an edge of a forefront portion of an electrode of the two opposed electrodes for generating the discharge plasma is not lower than 10^{-5} T and not higher than 1 T.

22 The method according to claim 15, wherein in the discharge plasma generating step, discharge current density at the time of generating the discharge plasma is not lower than 0.05 A/mm^2 and not higher than 15 A/mm^2 with respect to an area of a forefront portion of an electrode for generating the discharge plasma.

23 The method according to claim 15, wherein in the voltage applying step, the voltage applied to the electrodes is not lower than 1 V and not higher than 30 V.

24 The method according to claim 15, wherein in the voltage applying step, the voltage applied to the electrodes is a DC voltage.

25 The method according to claim 24, wherein an area of a forefront portion of a cathode of the two opposed electrodes is not larger than an area of a forefront portion of an anode thereof.

26 The method according to claim 15,

wherein material of the electrodes is one of carbon and material which contains carbon; and

electric resistivity of the material is not lower than

0.01 Ω·cm and not higher than 10 Ω·cm.

27 The method according to claim 15, wherein pressure of an atmosphere in the discharge area is not lower than 0.01 Pa and not higher than 510 kPa.

28 The method according to claim 15, wherein an atmosphere in the discharge area is a gas atmosphere containing at least one gas selected from the group of air, helium, argon, xenon, neon, nitrogen and hydrogen.

29 The method according to claim 15, wherein gas made of material containing carbon is included in an atmosphere in the discharge area.